Appendix K

Dive Survey Report, Dupont Barge-Loading Facility

Dive Survey Report
Pioneer Aggregates Barge Loading Facility
Dupont, Washington, January 21st, 2000

Introduction

Lone Star is proposing to expand levels of mining at its gravel mine on Maury Island, Washington, and to load sand and gravel onto barges from the site. Barge loading would be accomplished using a conveyor system, with a spill tray, on an existing dock. The depth of water at the loading point at the end of the dock is between 20 feet and 30 feet MLLW, possibly due to past gravel spillage. Other areas, waterward of the dock and associated dolphins, are generally greater than 30 feet deep.

Under maximum production conditions, the proposal calls for loading up to four 10,000 ton barges per day, seven day a week,. A fully loaded 10,000 ton barge has a draft of approximately 16 to 17 feet. If significant spillage were to occur from the proposed loading operations, the depth at the end of the dock would no longer be sufficient for fully loaded barges. Additionally, marine life under or near the dock and barges may also be adversely affected by significant spillage of sand and gravel.

To assess the potential for spillage due to barge loading an examination of an existing facility was undertaken. A dive survey was completed at the barge loading facility at the Pioneer Aggregates Mining Facility in Dupont, Washington. The Dupont loading facility, constructed in 1995, is state of the art, with a fully enclosed conveyor system, and a movable boom, which allows positioning of the end of the conveyor above tha barges. The barges are positioned through the use of an electrically operated cable system (haul back system), which moves the barges forward and backward alongside the dock.

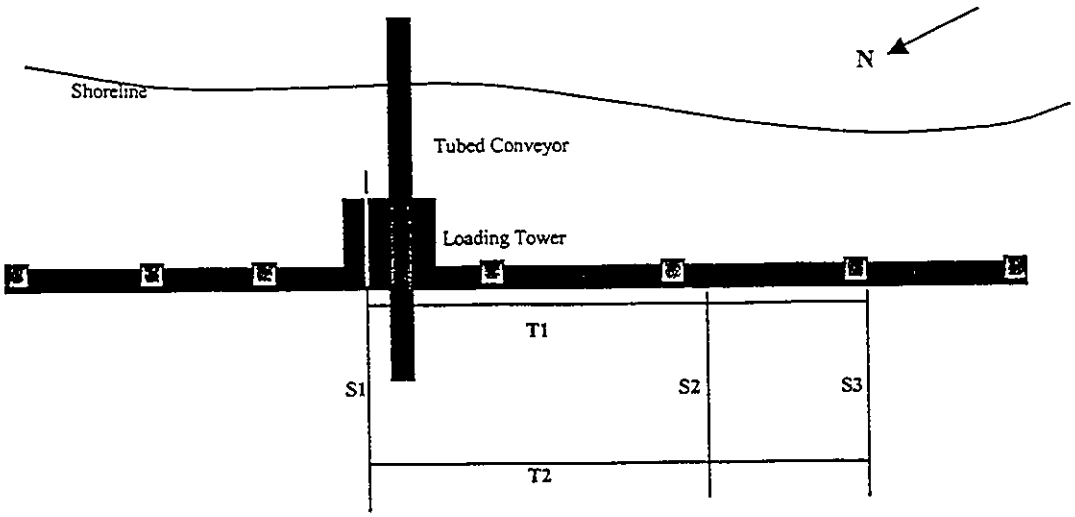
Methods

Prior to the dive, pre-construction underwater video tapes, of the Dupont site, were reviewed to assess substrate types, habitats, and existing biological communities. The dive survey was conducted January 21st, 2000 at slack high low tide and consisted of several transects parallel and perpendicular to the shoreline. Benthic substrate, habitat and community structure was evaluated qualitatively. Evidence of spillage from loading was noted and rough volumes were estimated.

Transects

Transect T1 was located at the front of the dock, parallel to the shoreline, extending from the loading area out to the southern fendering dolphins (Figure 1). An additional transect (T2), was located parallel to the shoreline, approximately 100 feet further from shore. Three transects were located perpendicular to the shoreline one extending beneath the loading tower (S1) and two located approximately 50 (S2) and 75 (S3) feet southward.

Figure 1



Results

The surveys along transect T1 indicated significant amounts of spillage of medium sized gravel (1-2 cm diameter) had occurred. The gravel was mounded in piles running parallel to the dock each 3-10 feet high and 5-15 feet long. The gravel appeared relatively fresh and did not have significant algal accumulations or other settlements of marine organisms. Large seastars *(Pycnopodia helianthoides)* were seen moving across the gravel. Further along the transect (~100 feet), gravel mounds were no longer present and the substrate consisted of fine sandy/silty sediment. There was very little evidence of a large benthic infaunal community with few mollusk (shellfish) siphon holes or annelid (worm) castings apparent. In this region there were a few species of macroalgae (mainly *Lamineria saccharina)* sparsely distributed, typically attached to the occasional cobble or other hard substrate.

Transect T2 was very similar to transect T1 with several gravel mounds in the loading area changing to a sandy/silty substrate further south.

Transect S1 extended under the loading tower between the dock pilings. The piling community primarily consisted of mussels and barnacles at the shallower depths. Deeper on the pilings, anemones (*Metridium spp.)*, calcarious tube worms (*Serpula spp.),* crabs (*Cancer productus* and *Pugettia producta)*, and false jingles (*Pododesmus sp.)* were common. No fish were observed. The substrate consisted of mounded gravel as described above.

Transects S2 and S3 started from the end of the dock and extended ~100 feet wtaerward. At the end of the dock gravel mounds were present, followed by a gravelly sandy sediment (without mounds). At the end of the transect gravel mounds were present. The community structure was similar to that described above for transect T1.

It was evident from the dive survey that significant amounts of gravel were spilled during loading at the Dupont site. In the area investigated, between 3000 and 10,000 cubic feet of material was estimated to have been deposited. The accumulation of gravel was concentrated along two distinct bands parallel to the shoreline, and under the loading tower. The gravel bands correspond with the shoreward and waterward sides of a barge being loaded. The length of the gravel bands was limited to the range of motion of the loading boom. Immediately underneath the loading tower a significant amount of gravel had accumulated, but the depth of the pile was difficult to determine without knowing the slope of the original substrate. Between the two bands of gravel there was little to no additional accumulation of gravel. There was no evidence of significant transport of material by tidal currents at the site.

Macroalgae or other macroscopic marine organisms had not colonized the newly deposited gravel. There was no evidence of accumulation of fine sediments along any of the transect lines surveyed. The benthic community away from the spillage was not significantly different from what was recorded during pre dock construction surveys.

The spillage at the site has covered the original substrate in the area around the edges of the center section of the barge. The gravel was deposited recently enough, or frequently enough, to preclude the re-establishment of a benthic community. The disturbance to the benthic community appears to be limited to the spill area itself and does not extend into the greater dock area.

Discussion

Implications for the proposed Maury Island loading facility

If loading were conducted in a similar manner as at the Dupont facility, significant spillage of gravel would be expected. This poses a number of problems both logistically and environmentally. The depth at the end of the conveyor at the Maury Island dock is ~20 feet at its shallowest point. Any additional accumulation in this area could cause fully loaded barges to ground during negative tides. Spillage would bury the benthic community currently located at the end of the dock. If the frequency of spillage were high, the re-establishment of the benthic community would be delayed.

The use of a movable boom at the Dupont site, designed to minimize noise during loading, may in fact be responsible for increased spillage. Currently, a movable boom directs the placement of material being loaded into the barge. The barge is positioned, along the dock, through the use of a haul back system. The movable boom may cause spillage when it is extended in front of or over the edge of the barge. Spillage may be increased through attempts to maximize barge capacity.

Possible mitigation.

Spillage at the Maury Island site could be minimized or avoided through several operating procedures. A movable boom should not be utilized at the Maury Island site. The conveyor could be fixed to load the barge along its centerline. The end of the conveyor could utilize a down pour spout to contain material while falling to the barge

surface. The barge could be positioned, along the dock, through the use of a haul back system. Barges could only be allowed to be loaded to 85% maximum capacity. An automatic conveyor cut off switch could prevent the conveyor from running unless a barge is docked. The combination of these loading elements would significantly reduce spillage during loading at the Maury Island facility.

Expected Impacts.
Small amounts of spillage would not be expected to cause significant impacts to the benthic community at the Maury Island site. The existing substrate is similar to the material being loaded and thus would not alter the substrate composition. The area impacted by any spillage would be relatively small and limited to the end of the conveyor. Transport of spilled material to other sensitive habitats (eelgrass, sunken barges) would not be expected with the tidal currents commonly encountered near the Maury Island site.

At the Dupont site, there was no evidence of disturbance to the benthic habitat outside of the area directly covered by spilled gravel. However, pre-construction surveys indicated a relatively minimal benthic community in this area. This can be explained in part by the depth of the area in front of the dock, which is between 45 and 65 feet MLLW, thus limiting available light.

The Maury Island site is considerably shallower and has macroalgae and benthic infaunal communities established at the end of the dock. Significant spillage would bury and eliminate these organisms directly beneath the spill. Most of the organisms could tolerate small amounts of spillage since they are evolutionarily adapted to dynamic sandy shoreline environments.